Space Weather Forecast

Issued on Thursday, 24 August 2023 at 13:15 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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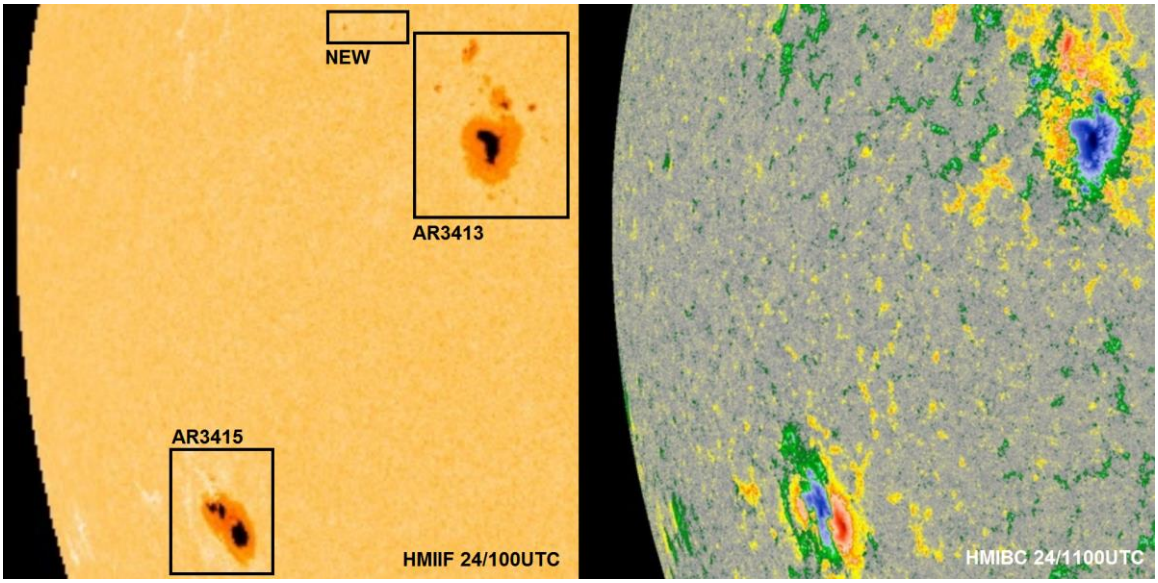
Space Weather Forecast Headline: Now reduced Slight Chance of Minor Geomagnetic Storm G1 in current UTC day. Ongoing Chance of R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is currently low, with occasional low-level Common-class X-ray flares observed. The peak flare during the period was a mid-ranking Common-class peaking at 23/1407UTC from a small sunspot group in the northwest - with a small developing leading spot seen ahead of the larger main trailing spot.

Figure 1: Latest visible and magnetic polarity imagery of the eastern central portion of the Sun, showing the current complexity of two of the largest occupants (with their associated Active Region (AR) numbers). Despite this apparent complexity, signficant flares have not yet been observed.



There are now up to six sunspot regions on the facing side of the Sun, with one having decayed as a potential new region has developed to the immediate northeast of one of the largest, nominally complex groups. This group has an atypical orientation that may make it more liable to instability, as well as the fact it has undergone some significant spot growth in its northern half in recent hours. Also of note is a large group in the southeast, although its slight fading tendency may be helping to mollify this group's activity. Other regions on the Sun were stable and apparently simpler.

There were a few potential Coronal Mass Ejection (CME) progenitor events of note in the period.

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A large 'C-shaped' coronal dimming and small Common-class flare occurred from around one of the large eastern hemisphere sunspot groups at 23/1616UTC - no subsequent CME was noted. A 'filament eruption' (arc of plasma leaving the Sun) occurred around 23/1930UTC from the southwest disc, manifested in UTC evening satellite imagery as a visually southward-directed Coronal Mass Ejection (CME) near the Sun-Earth line. This appears to have pivoted about its eastern anchor point - hence the apparently mainly southward rather than southwestward trajectory. This event has been analysed and is expected to miss, passing below the Earth from limited imagery. Finally, at the very end of the 24-hour window, a large 'prominence' eruption appeared to be in progress on the northeastern solar horizon (arc of plasma leaving the edge of the facing side). This is not yet visible in satellite imagery, however any Earth-directed component is considered very unlikely. No other potentially Earth-directed CMEs were identified.

Solar Wind / Geomagnetic Activity: Solar wind speeds persisted at slightly elevated levels in the probable tail of a fast wind.

The solar wind speed fell very gradually through slightly elevated levels, with the number of particles steady and within typical background over the same interval. The magnitude of the magnetic field was steady and also within its typical range, while the north-south component was small and mainly showed a co-aligned bias with Earth's field (to most frequently limit geomagnetic effects).

The net effect of the above solar wind measures was for provisional quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be generally low, but with a continuing chance of isolated Moderate-class flares. No significant returning regions are due, and only one is due to depart at the very end of the coming four days. Because this is the only region to have produced an Moderate-class flare in the past week, its departure is marked by a slight drop in probabilities on Sunday 27 August.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs that feature in the forecast. Up to two fast wind streams should materialise - the first imminent and presenting a slight chance of Minor Geomagnetic Storm G1 within the remainder of the current UTC day. After a lull towards quieter conditions, a second, smaller peak in risk is possible by the end of the upcoming UTC weekend.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with no recent history of such and with the nominally more potent sunspot regions currently in the less well-connected eastern solar hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	1	1	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	20
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	2	2	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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